

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-333749

(43)Date of publication of application : 21.11.2003

(51)Int.Cl.

H02J 3/00
H02J 13/00
H04B 3/54

(21)Application number : 2002-136374

(71)Applicant : CANON INC

(22)Date of filing : 13.05.2002

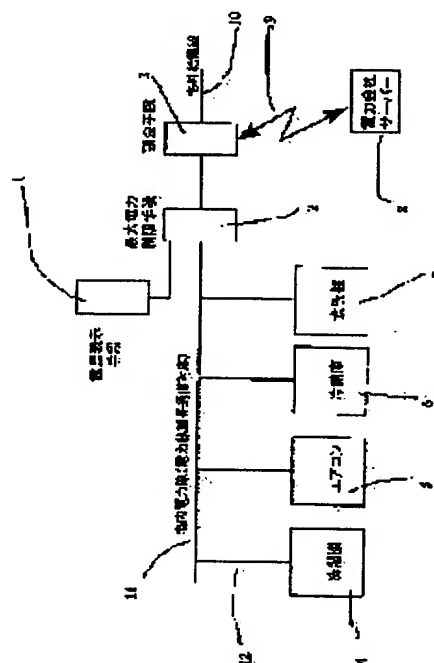
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(54) POWER SUPPLY CONTROL AND CHARGE COUNTING SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a power supply control and charge counting system which is easy to obtain a power user's cooperation by interlocking a power control function and a counting function so as to realize the planned use and saving of the power by introducing increase in the power consumption as an overall community by the increase of indoor electric devices and a constantly power on state even if a network in the home is convenient and can realize a comfortable life.

SOLUTION: The power supply control and charge counting system for controlling and accounting the power to the electric device comprises: a judging means for judging whether a power can be supplied to the electric device within first allowed power consumption or a second allowed power consumption (he first > second); an inten display means for displaying the intention of whether a power user cooperates with the planned power use or not at each demander; a counting means for counting a bonus and a power charge; and a maximum power limit means.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the
examiner's decision of rejection or application converted
registration]

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[Patent number]

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CLAIMS

[Claim(s)]

[Claim 1] They are the control which connects two or more electrical machinery and apparatus, and supplies power to these electrical machinery and apparatus, the electric power supply control which performs accounting, and an accounting system. Within the 1st permission power consumption or the 2nd permission power consumption (the 1st power consumption > 2nd power consumption) A decision means to judge whether power can be supplied to said electrical machinery and apparatus, and a declaration-of-intention means to indicate whether a power user cooperates in planned power use for every consumer, The electric power supply control and the accounting system which consist of an accounting means to charge a bonus and power dues, and a maximum power-restrictions means.

[Claim 2] The electric power supply control and the accounting system of claim 1 by which said accounting means consists of an electric-energy-measurement means, a structured data storage means, and means of communications.

[Claim 3] The electric power supply control and the accounting system of claim 1 by which said declaration-of-intention means consists of a declaration-of-intention change means, a timer means, and an information-display means.

[Claim 4] In the control which connects two or more electrical machinery and apparatus, and supplies power to these electrical machinery and apparatus, the electric power supply control which performs accounting, and an accounting system within permission power consumption or the 2nd permission power consumption (the 1st power consumption > 2nd power consumption) The electric power supply control and the accounting approach which consist of a process which judges whether power can be supplied to said electrical machinery and apparatus, a process which indicates whether a power user cooperates in planned power use for every consumer, and a process which a cooperation bonus and power dues are calculated and is charged for said every cooperation consumer.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Network connection of the electrical machinery and apparatus in ** is carried out by power-line superposition communication technology etc., and this invention relates to the electric power supply control and the accounting system which perform electric power supply control and accounting of the inside of **, and the whole community.

[0002]

[Description of the Prior Art] In recent years, the prospect that various electrical machinery and apparatus can apply and connect power superposition communication technology etc. by network gets down earnestly, and attracts attention very much. Power-line superposition communication technology is a technique of enabling it to use the power-source line for supplying power as a network for an information communication link. The electric power supply control to the conventional electrical machinery and apparatus in ** and an accounting system consist of breaker equipment and a watt-hour meter which measures the consumed electric power for every consumer in order to restrict the electric power supply more than constant value, and they do not have advanced functions, such as network connection. Moreover, people intervene between the activities which charge a consumer according to operating electric energy, and the value of each consumer's watt-hour meter is investigated to them.

[0003]

[Problem(s) to be Solved by the Invention] The network in ** is convenient, while it realizes a comfortable life by the intelligent device, has a possibility of making a power-source ON state an increment and always [of the electrical machinery and apparatus in **] increasing, and causes the increment in consumed electric power and peak power consumption as the whole society. Neither by the energy-saving enlightenment activities by the electric power company, nor the device of the tariff structure, although it is going to realize planned use and saving of power, high effectiveness has necessarily shown up. First of all, power consumption results are collected the long period of a unit for one month, and charging is only possible. Moreover, although the power consumption in ** is taken into consideration and operation can be intentionally managed with the electrical machinery and apparatus corresponding to the network in **, and a power-line superposition communication mode, a user will be forced inconvenience, like there is a device which cannot be used to use. As a result, he buys a user's disrepute and planned operation of the above-mentioned electrical machinery and apparatus has a possibility that it may not spread.

[0004] In order that this invention might be made in view of said trouble and may enable it to realize planned use and saving of power, it interlocks a power control function, and accounting / bonus function, and aims at offering the electric power supply control and the accounting system by which substantial cooperation of a consumer is easy to be obtained.

[0005]

[Means for Solving the Problem] In order to solve this technical problem, this invention connects two or more electrical machinery and apparatus. They are the control which supplies power to these electrical machinery and apparatus, the electric power supply control which performs accounting, and an accounting system. Within the 1st permission power consumption or the 2nd permission power consumption (the 1st power consumption > 2nd power consumption) It has a decision means to judge whether power can be supplied to said electrical machinery and apparatus, a declaration-of-intention means to indicate whether a power user cooperates in planned power use for every consumer, an accounting means to charge a bonus and power dues, and the maximum power-restrictions means.

[0006] Since its intention of the propriety of planned power use can be easily indicated for every power-requirements house and the bonus by the electronic means can be distributed by the above-mentioned configuration, it can complain of the effectiveness of cooperation to a consumer directly.

[0007]

[Embodiment of the Invention] The operation gestalt of this invention is explained referring to a drawing below.

[0008] (1st operation gestalt) Drawing 1 is what showed the example of a configuration of the electric power supply control concerning the 1st operation gestalt of this invention, and the whole accounting system, and the communication network is constituted using the power-line network to which the electrical machinery and apparatus in ** and power control / accounting equipment were connected.

[0009] In drawing 1, the power line 11 in ** constitutes the inside LAN of ** (Local Area Network) by the power-line superposition communication mode while supplying power to the electrical machinery and apparatus in **. As an electrical machinery and apparatus in **, specifically, it connects into [LAN] ** at the same time a dishwasher 7 is connected with a washing machine 4, an air-conditioner 5, and a refrigerator 6 and it receives supply of power. The electrical machinery and apparatus connected is not what was restricted to these. Since it is indicated by JP,10-94199,A, the explanation as the above-mentioned communication system is omitted. The maximum-electric-power control means 2 enters between the power line 11 in **, and the feeder 10 outside ** from an electric power company, it is supervised so that domestic power consumption may not exceed a constant rate, and the breaker function to restrict supply of power when this exceeds, and the communication link with the electrical machinery and apparatus in ** are performed. The declaration-of-intention means 1 is a means by which a consumer sets up a switch, in order to indicate whether it takes part in the planning to the teleis of the power which an electric power company invites, and the plan of a saving tariff. The accounting means 3 enters between the power line 11 in **, and the feeder 10 outside ** from an electric power company, and, generally is arranged from the maximum power-restrictions means 2 at the outdoor feeder side of an electric power company. The accounting means 3 communicates with the electric power company server 8, and is charged to a power-requirements house at the same time it measures the electric energy consumed within **. Drawing 4 shows the example of a configuration of the accounting means 3 in drawing 1. The electric-energy-measurement means 43 arranged between the feeder 41 in ** and the feeder 42 outside ** measures

the amount of the power used for every consumer. The structured data storage means 44 is arranged between the electric-energy-measurement means 43 and the below-mentioned means of communications 45. Means of communications 45 performs the amount of the power used, accounting, and the information communication link in connection with bonus information with the electric power company server 8 shown in drawing 1. The information acquired by the above-mentioned information communication link and the data measured with the electric-energy-measurement means 43 are memorized by structuring description languages, such as HTML or XML, in the structured data storage means 44.

[0010] Drawing 5 (a) shows the example of a configuration of the declaration-of-intention means 1 of drawing 1. The declaration-of-intention change means 52 is a switch which a consumer operates, in order to indicate whether it takes part in the planning to the telesis and saving tariff plan of power which an electric power company invites. Specifically, there is a case of a physical switch or the software switch by computer display. The information-display means 51 are the condition of the above-mentioned declaration-of-intention change means 52, and a drop which displays accounting and bonus information. Specifically, a liquid crystal display, LED and EL, a plasma display, a CRT display, etc. are applicable. The timer means 53 is a delay unit which performs ON state maintenance of the declaration-of-intention change means 52. That is, after a user turns ON the declaration-of-intention change means 52, even if it returns to an OFF state, unless fixed time amount passes, it does not return to an OFF state. Thereby, the planned generation of electrical energy and electric supply by the side of the electric power company which manages the telesis of power are attained.

[0011] Drawing 5 (b) is an activity Fig. showing the flow of drawing 5 (a) of operation. The view of an activity Fig. is explained first. The circle which smeared away the interior shows the radix point which starts a series of processings. the graphic form of a rhombus -- branching of processing -- being shown -- branch condition -- the near -- parenthesis [--] -- it is described inside. An arrow head shows the flow of processing. As for the graphic form of an ellipse, the contents of processing are described in it. A duplex circle shows termination of a series of processings. From a start, processing is started, and the condition of the timer means 53 is first judged and branched by processing AC 1. If the timer means 53 is already working, it will be alike and processing will be finished. If the timer means 53 is stopping, it will shift to processing AC 2. In processing AC 2, the condition of a declaration-of-intention change means is read. By processing AC 3, if the above-mentioned condition is in an ON state, it will progress to processing AC 4, and if it is in an OFF state, processing will be ended at an end. In processing AC 4, the timer means 53 will be started and the delay function which performs ON state maintenance will work. Next, in processing AC 5, while notifying the above-mentioned ON state to the maximum power-restrictions means 2 and the accounting means 3 of the next step, it is notified also to the electric power company server 8. It will come out, if processing AC 5 is completed, and all processings are ended. Thus, since the function of the declaration-of-intention means 1 can be expressed as a flow, the implementation means is realizable with not only hardware but the program of a computer.

[0012] Drawing 7 shows the example of a configuration of the maximum power-restrictions means 2 of drawing 1. The breaker section 61 arranged between the power line 65 in ** and the power line 66 outside ** can restrict an electric power supply by the indication signal line 67 from the decision section 63. The power test section 62 measures the current which flows the breaker section 61, and notifies the result to the decision section 63. The permission power storage section 64 has memorized the maximum of the permission power set up for every consumer, and has memorized at least two permission power values (the 1st permission power value, 2nd permission power value). The 1st permission power value is a maximum-permissible-power value usually applied sometimes, and the 2nd permission power value is a maximum-permissible-power value at the time of the telesis of power. namely, permission power value [of ** a 1st] > -- the relation of the 2nd permission power value is realized. Although the two above-mentioned permission power values can be set up when installing physically the maximum power-restrictions means in drawing 1 in each consumer's **, they can be set up from the electric power company server 8 by the communication link which went via the power-line superposition communication wires 68 and 69.

[0013] Drawing 6 is a sequence diagram illustrating electric power supply control of drawing 1, and actuation of an accounting system. The time-axis is expressed perpendicularly and time amount passes from a top to the bottom. The object 101, i.e., an electrical machinery and apparatus, currently observed within electric power supply control and an accounting system, the declaration-of-intention means 102, the maximum power-restrictions means 103, the accounting means 104, and the electric power company server 105 are expressed horizontally.

[0014] In the sequence SQ1, a tariff and bonus information are transmitted to the accounting means 104 from the electric power company server 105. In a sequence SQ2, the above-mentioned accounting means 104 transmits the received tariff and bonus information to the declaration-of-intention means 102. A power user indicates his intention of participation, after perusing the above-mentioned tariff and bonus information with the declaration-of-intention means 102 51, i.e., the information-display means of drawing 5 (a), when [to the telesis and saving tariff plan of power which an electric power company invites] taking part in the planning. Consequently, in a sequence SQ3, planned use consent information is sent to the maximum power-restrictions means 103 from the declaration-of-intention means 102. Next, by the sequence SQ4, the maximum power-restrictions means 103 notifies planned use initiation to the accounting means 104. By the sequence SQ5, the accounting means 104 notifies planned use initiation to the electric power company server 105 similarly. The electric power company server which received the above-mentioned notice recognizes planned use initiation by the sequence SQ6. Next, in a sequence SQ7, the accounting means 104 performs the notice of authorization of planned use to the maximum power-restrictions means 103. Similarly, the maximum power-restrictions means 103 notifies planned use authorization to the declaration-of-intention means 102 by the sequence SQ8. When exceeding the maximum electric power specified by planned use of power, a power use limit is notified to an electrical machinery and apparatus by the sequence SQ9. When exceeding maximum electric power, it notifies, and also the simultaneous multiple address of the purport with a limit of power use can also be beforehand carried out to all electrical machinery and apparatus.

[0015] (2nd operation gestalt) Drawing 2 is what showed the example of a configuration of the electric power supply control concerning the 2nd operation gestalt of this invention, and the whole accounting system, and the communication network is constituted using the power-line network to which the electrical machinery and apparatus in ** and power control / accounting equipment were connected.

[0016] In drawing 2, the declaration-of-intention means 23 is a means by which a consumer sets up a switch, in order to indicate whether it takes part in the planning to the telesis and saving tariff plan of power which an electric power company invites. It connects with the accounting means 22 and the declaration-of-intention means 23 can perform the check by the electric power company personnel easily. Since other configurations are the same as that of the 1st operation gestalt, explanation is omitted.

[0017] (3rd operation gestalt) Drawing 3 is what showed the example of a configuration of the electric power supply control concerning the 3rd operation gestalt of this invention, and the whole accounting system, and the communication network is constituted using the power-line network to which the electrical machinery and apparatus in ** and power control / accounting equipment were connected.

[0018] In drawing 3, the declaration-of-intention means 31 is a means by which a consumer sets up a switch, in order to indicate

whether it takes part in the planning to the telesis and saving tariff plan of power which an electric power company invites. Direct continuation of the declaration-of-intention means 31 is carried out to the power line 34 in **. When a consumer takes part in the planning of the telesis of power, it switches on with the declaration-of-intention means 31. The above-mentioned switch condition is transmitted to the maximum power-restrictions means 32 and the accounting means 33 by the power-line superposition communication mode via the power line 34 in **. When a switch condition is ON, i.e., planned power use, maximum electric power is restricted to the maximum power-restrictions means 32 at a value lower than usual. Since other configurations are the same as that of the 1st operation gestalt, explanation is omitted.

[0019]

[Effect of the Invention] Since according to this invention its intention of the propriety of planned power use can be easily indicated for every power-requirements house and the bonus by the electronic means can be distributed by the configuration which consists of a declaration-of-intention means to indicate whether a power user cooperates in planned power use for every consumer, an accounting means to charge a bonus and power dues, and a maximum power-restrictions means as explained above, it can complain of the effectiveness of cooperation to a consumer directly. Consequently, saving of power and effective use are attained as the whole community.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The electric power supply control concerning the 1st operation gestalt of this invention, and the example of a configuration of the whole accounting system.

[Drawing 2] The electric power supply control concerning the 2nd operation gestalt of this invention, and the example of a configuration of the whole accounting system.

[Drawing 3] The electric power supply control concerning the 3rd operation gestalt of this invention, and the example of a configuration of the whole accounting system.

[Drawing 4] The example of an internal configuration of the accounting means 3 of drawing 1 .

[Drawing 5] (a) The example of an internal configuration of the declaration-of-intention means 1 of drawing 1 .

(b) The activity Fig. showing the interior-action flow of the declaration-of-intention means 1 of drawing 1 .

[Drawing 6] The sequence diagram illustrating electric power supply control of drawing 1 , and actuation of an accounting system.

[Drawing 7] The example of an internal configuration of the maximum power-restrictions means 2 of drawing 1 .

[Description of Notations]

1 Declaration-of-Intention Means

2 The Maximum Power-Restrictions Means

3 Accounting Means

8 Electric Power Company Server

10 Power Line outside **

11 Power Line in **

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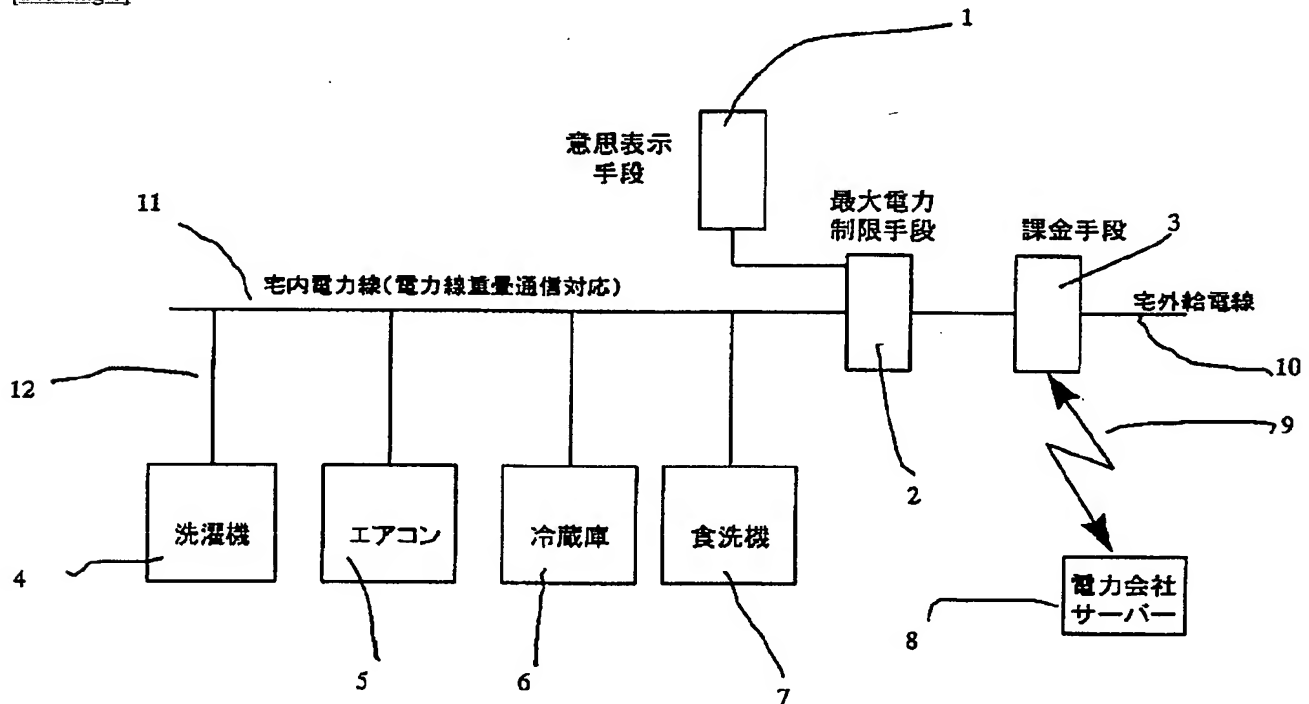
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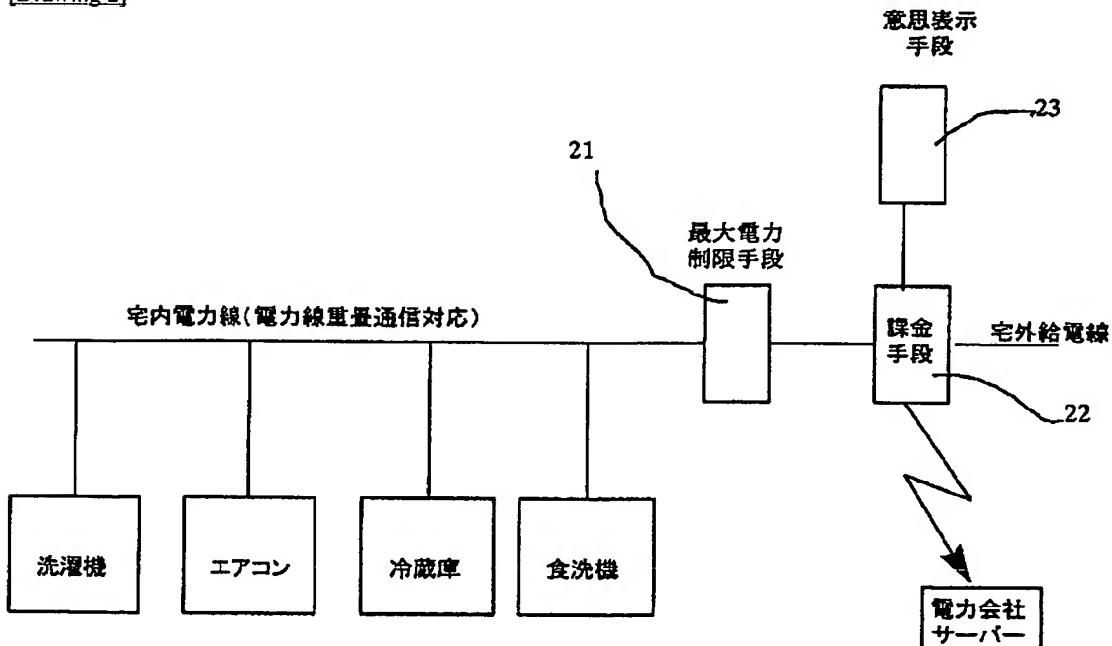
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DRAWINGS

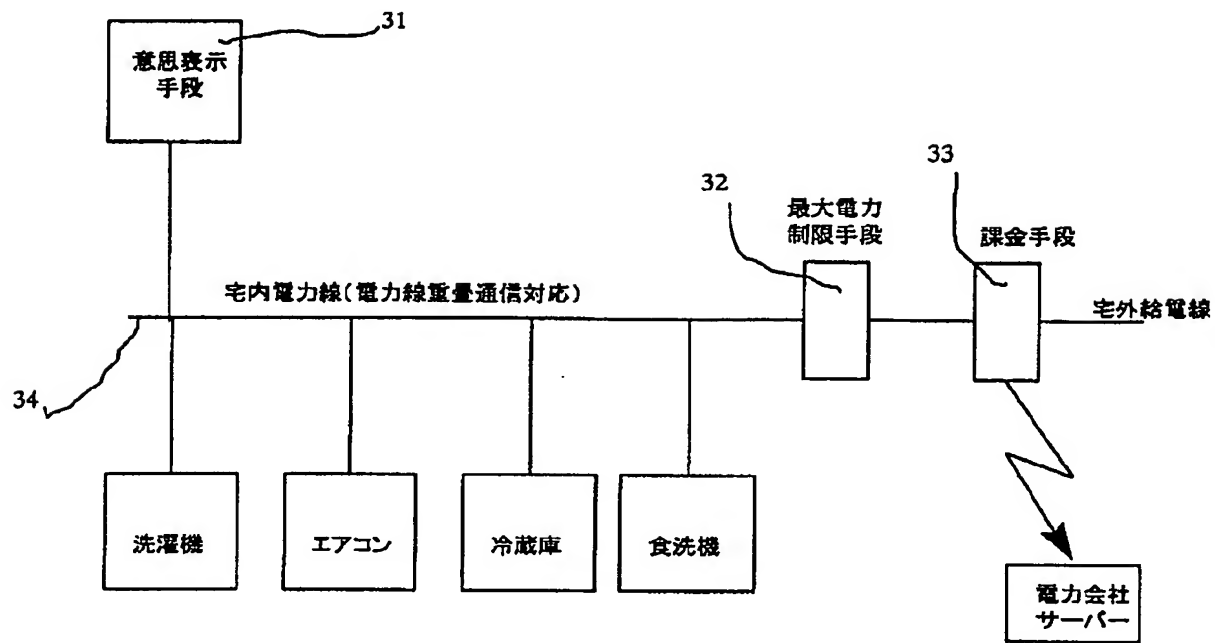
[Drawing 1]



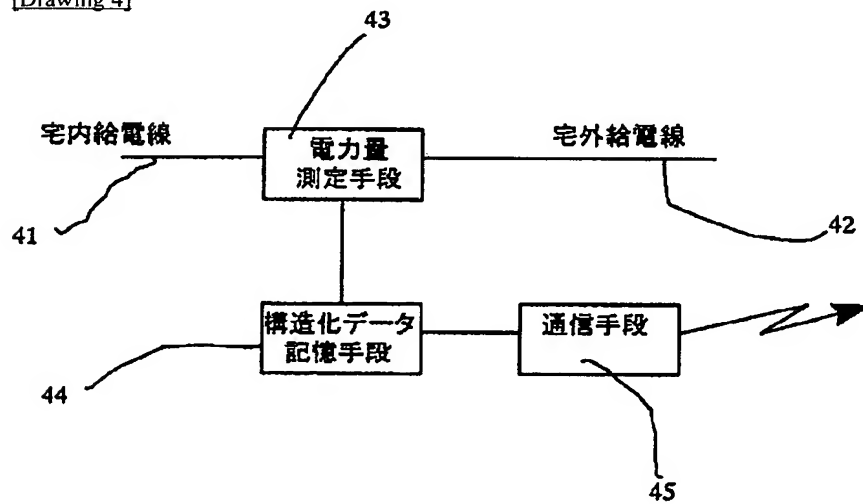
[Drawing 2]



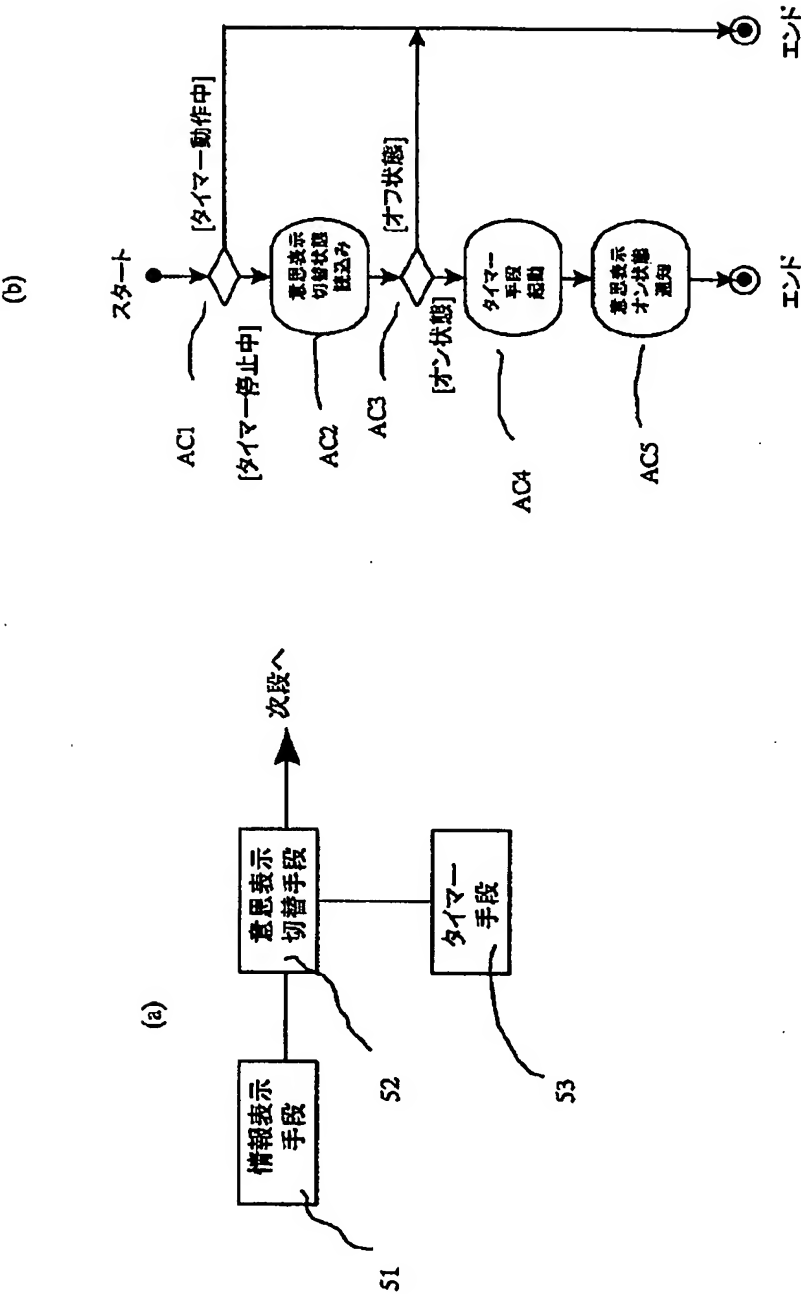
[Drawing 3]



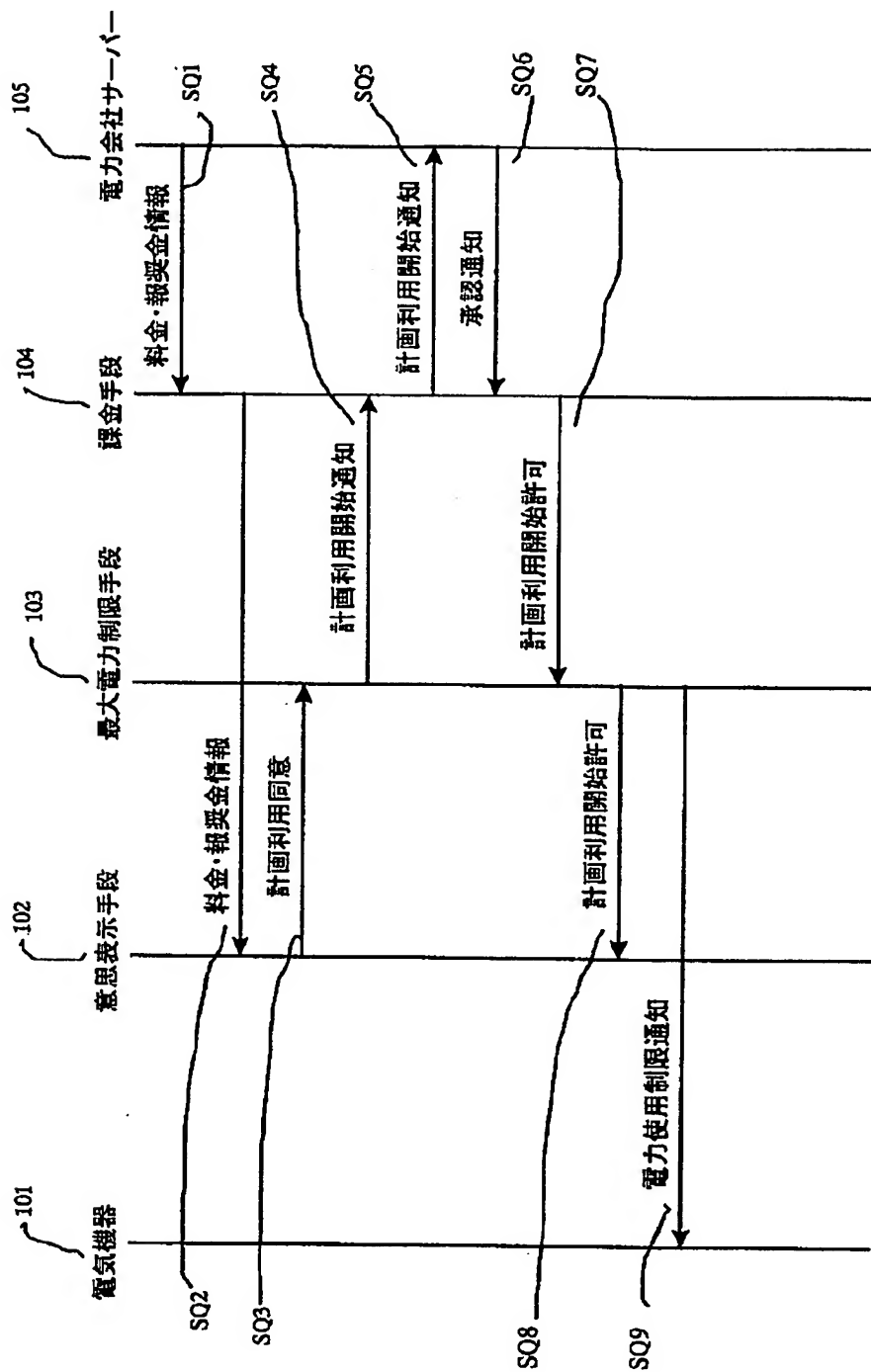
[Drawing 4]



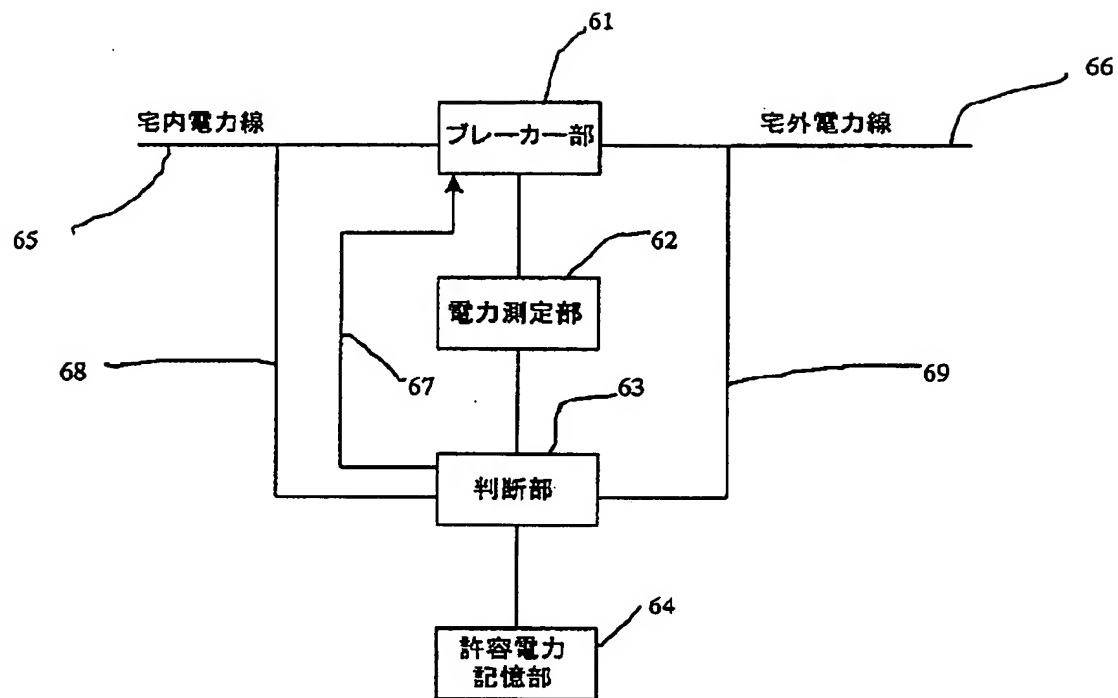
[Drawing 5]



[Drawing 6]



[Drawing 7]



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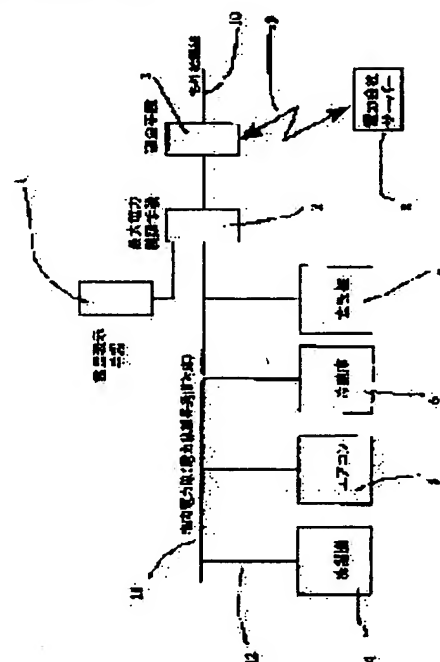
(72)Inventor : MORI TETSUZO

(54) POWER SUPPLY CONTROL AND CHARGE COUNTING SYSTEM

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decision of rejection]

[Date of extinction of right]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2003-333749

(P2003-333749A)

(43) 公開日 平成15年11月21日 (2003. 11. 21)

(51) Int.Cl. ⁷	識別記号	F I	テ-マ-ト (参考)
H 0 2 J 3/00		H 0 2 J 3/00	B 5 G 0 6 4
13/00	3 1 1	13/00	3 1 1 T 5 G 0 6 6
H 0 4 B 3/54	Z E C	H 0 4 B 3/54	Z E C 5 K 0 4 6

審査請求 未請求 請求項の数4 O L (全 9 頁)

(21) 出願番号 特願2002-136374(P2002-136374)

(22) 出願日 平成14年 5 月13日 (2002. 5. 13)

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Fターム(参考) 5G064 AA09 AC01 AC03 AC06 AC09

CB08 CB12 DA07

5G066 KA01 KA04 KA12 KB06

5K046 AA03 BA07 BB05 BB06 CC17

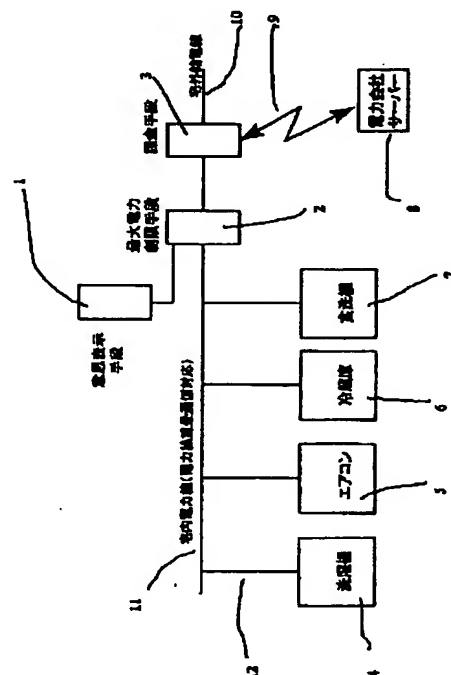
PP01 PS29

(54) 【発明の名称】 電力供給制御及び課金システム

(57) 【要約】

【課題】 宅内のネットワーク化は便利で、快適な生活を実現するが、宅内電気機器の増加と常時電源オン状態により、地域社会全体としての消費電力の増加を招く。電力の計画的利用と節約を実現できるように、電力制御機能と課金機能を連動させて、電力需要家の協力が得られやすい電力供給制御課金システム。

【解決手段】 電気機器に対して電力を供給する制御と課金を行う電力供給制御及び課金システムであって、第1の許容消費電力または第2の許容消費電力(第1>第2)以内で、前記電気機器に電力を供給できるか否かを判断する判断手段と、各需要家毎に電力使用者が計画的電力利用に協力するか否かを意思表示する意思表示手段と、報奨金及び電力使用料を課金する課金手段と、最大電力制限手段を有する。



【特許請求の範囲】

【請求項 1】 複数の電気機器を接続して、これら電気機器に対して電力を供給する制御と課金を行う電力供給制御及び課金システムであって、第 1 の許容消費電力または第 2 の許容消費電力（第 1 の消費電力＞第 2 の消費電力）以内で、前記電気機器に電力を供給できるか否かを判断する判断手段と、各需要家毎に電力使用者が計画的電力利用に協力するか否かを意思表示する意思表示手段と、報奨金及び電力使用料を課金する課金手段と、最大電力制限手段で構成される電力供給制御及び課金システム。

【請求項 2】 前記課金手段が、電力量測定手段と構造化データ記憶手段と通信手段で構成される請求項 1 の電力供給制御及び課金システム。

【請求項 3】 前記意思表示手段が、意思表示切替手段とタイマー手段と情報表示手段で構成される請求項 1 の電力供給制御及び課金システム。

【請求項 4】 複数の電気機器を接続して、これら電気機器に対して電力を供給する制御と課金を行う電力供給制御及び課金システムにおいて、許容消費電力または第 2 の許容消費電力（第 1 の消費電力＞第 2 の消費電力）以内で、前記電気機器に電力を供給できるか否かを判断する工程と、各需要家毎に電力使用者が計画的電力利用に協力するか否かを意思表示する工程と、前記協力需要家毎に協力報奨金と電力使用料を計算し課金する工程から構成される電力供給制御及び課金方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は宅内電気機器が電力線重畳通信技術などでネットワーク接続され、宅内及び地域社会全体の電力供給制御と課金を行う電力供給制御及び課金システムに関する。

【0002】

【従来の技術】 近年、各種電気機器が電力重畳通信技術などを応用してネットワーク化できる目処がたっており、大変注目されている。電力線重畳通信技術は、電力を供給するための電源線を、情報通信用のネットワークとして使えるようにする技術である。従来の宅内電気機器への電力供給制御及び課金システムは、一定値以上の電力供給を制限するためブレーカー装置と、需要家毎の消費電力量を計測する電力量計で構成されており、ネットワーク接続などの高度な機能を有していない。また、使用電力量に応じて需要家に課金する作業には、人が介在して、各需要家の電力量計の値を調査している。

【0003】

【発明が解決しようとする課題】 宅内のネットワーク化は便利で、インテリジェントな機器により快適な生活を実現してくれる一方で、宅内電気機器の増加と常時電源オン状態を増加させる怖れがあり、社会全体として消費電力量及びピーク消費電力の増加を招く。電力会社によ

る省エネ啓蒙活動や料金体系の工夫により、電力の計画的使用と節約を実現しようとしているが、必ずしも高い効果がでていない。そもそも、1ヶ月単位の長周期で電力消費結果を収集し、課金することしかできていない。また、宅内ネットワークと電力線重畳通信方式対応の電気機器により、宅内の電力消費量を勘案して、計画的に運転を管理できるようになるが、使いたいときに使えない機器があるなどの不便を利用者に強いることになる。結果として、利用者の不評を買い、前述の電気機器の計画的運転は普及しない怖れがある。

【0004】 本発明は前記問題点に鑑みてなされたもので、電力の計画的使用と節約を実現できるようにするため、電力制御機能と課金／報奨金機能を連動させて、需要家の実質的協力が得られやすい電力供給制御及び課金システムを提供することを目的としている。

【0005】

【課題を解決するための手段】 この課題を解決するために、本発明は、複数の電気機器を接続して、これら電気機器に対して電力を供給する制御と課金を行う電力供給制御及び課金システムであって、第 1 の許容消費電力または第 2 の許容消費電力（第 1 の消費電力＞第 2 の消費電力）以内で、前記電気機器に電力を供給できるか否かを判断する判断手段と、各需要家毎に電力使用者が計画的電力利用に協力するか否かを意思表示する意思表示手段と、報奨金及び電力使用料を課金する課金手段と、最大電力制限手段を有するものである。

【0006】 上記構成により、電力需要家毎に計画的電力使用の可否を容易に意思表示することができ、かつ電子手段による報奨金を配布することができるので、協力の効果を直接、需要家に訴える事ができる。

【0007】

【発明の実施の形態】 以下に図面を参照しながら、本発明の実施形態について説明する。

【0008】（第 1 の実施形態） 図 1 は、本発明の第 1 の実施形態に係わる電力供給制御及び課金システムの全体の構成例を示したもので、宅内の電気機器及び電力制御・課金装置が接続された電力線網を用いて通信網が構成されている。

【0009】 図 1 において、宅内電力線 11 は、宅内の電気機器に電力を供給するとともに、電力線重畳通信方式により宅内 LAN（ローカルエリアネットワーク）を構成している。具体的には宅内電気機器として、洗濯機 4、エアコン 5、冷蔵庫 6 と食洗機 7 が接続されて電力の供給を受けると同時に、宅内 LAN に接続されている。接続される電気機器はこれに限ったものではない。前述の通信システムとしての説明は、特開平 10-94199 に開示されているので省略する。最大電力制御手段 2 は、宅内電力線 11 と電力会社からの宅外給電線 10 との間に入り、家庭内の電力消費量が一定量を超えないように監視し、これが超えた場合には電力の供給

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を制限するブレーカー機能や、宅内電気機器との通信を行う。意思表示手段1は、電力会社が募集する電力の計画的利用及び節約料金のプランへの参画するか否かの意思表示をするために、需要家がスイッチを設定する手段である。課金手段3は、宅内電力線11と電力会社からの宅外給電線10との間に入り、一般的には、最大電力制限手段2より電力会社の屋外給電線側に配置される。課金手段3は宅内で消費される電力を計測すると同時に、電力会社サーバ8と通信して、電力需要家に対して課金を行う。図4は、図1における課金手段3の構成例を示したものである。宅内給電線41と宅外給電線42の間に配置された電力計測定手段43は、需要家毎の電力使用量を計測する。構造化データ記憶手段44は電力計測定手段43と、後述の通信手段45の間に配置される。通信手段45は、図1に示す電力会社サーバ8と、電力使用量や課金、報奨金情報に関わる情報通信を行う。前述の情報通信によって取得した情報および、電力計測定手段43で計測されたデータは、HTMLまたはXMLなどの構造化記述言語によって、構造化データ記憶手段44内に記憶される。

【0010】図5(a)は、図1の意思表示手段1の構成例を示したものである。意思表示切り替え手段52は、電力会社が募集する電力の計画的利用及び節約料金プランへの参画するか否かの意思表示をするために、需要家が操作するスイッチである。具体的には、物理的スイッチあるいは、コンピュータ表示によるソフトウェアスイッチの場合がある。情報表示手段51は、前述の意思表示切り替え手段52の状態や、課金・報奨金情報を表示する表示器である。具体的には、液晶表示装置、LED、EL、プラズマ表示装置やCRT表示装置などが適用可能である。タイマー手段53は、意思表示切り替え手段52のオン状態保持を行う遅延装置である。すなわち、利用者が意思表示切り替え手段52をオンした後、オフ状態に戻しても、一定時間が経過しないとオフ状態に戻らない。これにより、電力の計画的利用を管理する電力会社側の、計画的発電および給電が可能になる。

【0011】図5(b)は、図5(a)の動作フローをあらわしたアクティビティ図である。まずアクティビティ図の見方を説明する。内部を塗りつぶした円は一連の処理を開始する基点を示す。ひし形の図形は処理の分岐を示し、分岐条件はその近傍にかっこ〔 〕内に記述されている。矢印は処理の流れを示す。長円形の図形はその中に処理内容が記述される。二重円は一連の処理の終了を示す。スタートより処理が開始され、まず、処理AC1にて、タイマー手段53の状態を判断・分岐する。タイマー手段53がすでに動作中であれば、エンドにて処理を終える。タイマー手段53が停止中であれば、処理AC2に移行する。処理AC2では意思表示切り替え手段の状態を読み込む。処理AC3では、前述の状態が

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オン状態であれば処理AC4に進み、オフ状態であればエンドで処理を終了する。処理AC4ではタイマー手段53を起動し、オン状態保持を行う遅延機能が働くことになる。次に処理AC5では前述のオン状態を、次段の最大電力制限手段2及び課金手段3へ通知するとともに、電力会社サーバ8へも通知する。処理AC5を完了するとエンドですべての処理を終了する。このように意思表示手段1の機能はフローとして表現することが可能であるので、その実現手段はハードウェアに限らずコンピュータのプログラムによっても実現可能である。

【0012】図7は、図1の最大電力制限手段2の構成例を示したものである。宅内電力線65と宅外電力線66との間に配置されたブレーカー部61は、判断部63からの指示信号線67によって、電力供給を制限することができる。電力測定部62はブレーカー部61を流れる電流を測定して、その結果を判断部63に通知する。許容電力記憶部64は、需要家毎に設定される許容電力の最大値を記憶しており、少なくとも二つの許容電力値(第1の許容電力値、第2の許容電力値)を記憶している。第1の許容電力値は通常時に適用される最大許容電力値であり、第2の許容電力値は電力の計画的利用時の最大許容電力値である。すなわち、第1の許容電力値>第2の許容電力値の関係が成り立つ。前述の二つの許容電力値は、図1における最大電力制限手段を各需要家の宅内に物理的に設置する時に設定可能であるが、電力会社サーバ8から、電力線重畳通信線68および69を経由した通信により設定可能である。

【0013】図6は図1の電力供給制御及び課金システムの動作を図示したシーケンス図である。垂直方向は時間軸を表わしていて、上から下へ時間が経過する。水平方向は電力供給制御及び課金システム内で注目しているオブジェクトすなわち、電気機器101、意思表示手段102、最大電力制限手段103、課金手段104と電力会社サーバ105を表わしている。

【0014】シーケンスSQ1では電力会社サーバ105から課金手段104へ料金・報奨金情報が送信されている。シーケンスSQ2では、前述の課金手段104は受信した料金・報奨金情報を意思表示手段102へ伝送する。電力利用者が電力会社の募集する電力の計画的利用及び節約料金プランへの参画する場合は、意思表示手段102すなわち、図5(a)の情報表示手段51で前述の料金・報奨金情報を閲覧した上で、参画の意思表示を行う。その結果、シーケンスSQ3において、意思表示手段102から最大電力制限手段103へ、計画利用同意情報が送られる。次にシーケンスSQ4で、最大電力制限手段103は課金手段104に対して、計画利用開始を通知する。同様にシーケンスSQ5では、課金手段104は電力会社サーバ105へ、計画利用開始を通知する。前述の通知を受けた電力会社サーバは、シーケンスSQ6にて計画利用開始の承認をする。次にシーケ

ンスSQ7では、課金手段104が最大電力制限手段103に対して、計画利用の許可通知を行う。同様に、シーケンスSQ8で最大電力制限手段103は意思表示手段102に対して、計画利用許可を通知する。電力の計画利用によって規定される最大電力を超える場合は、シーケンスSQ9にて、電気機器に対して電力使用制限を通知する。最大電力を超える場合に通知するほかに、未だにすべての電気機器に対して、電力使用の制限がある旨を一斉同報することもできる。

【0015】（第2の実施形態）図2は、本発明の第2の実施形態に係わる電力供給制御及び課金システムの全体の構成例を示したもので、宅内の電気機器及び電力制御・課金装置が接続された電力線網を用いて通信網が構成されている。

【0016】図2において、意思表示手段23は、電力会社が募集する電力の計画的利用及び節約料金プランへの参画するか否かの意思表示をするために、需要家がスイッチを設定する手段である。意思表示手段23は課金手段22に接続されており、電力会社職員による点検が容易に行える。その他の構成は第1の実施形態と同様であるので、説明を省略する。

【0017】（第3の実施形態）図3は、本発明の第3の実施形態に係わる電力供給制御及び課金システムの全体の構成例を示したもので、宅内の電気機器及び電力制御・課金装置が接続された電力線網を用いて通信網が構成されている。

【0018】図3において、意思表示手段31は、電力会社が募集する電力の計画的利用及び節約料金プランへの参画するか否かの意思表示をするために、需要家がスイッチを設定する手段である。意思表示手段31は宅内電力線34に直接接続されている。需要家が電力の計画的利用に参画する場合は、意思表示手段31にてスイッチをオンする。前述のスイッチ状態は、電力線重畳通信方式により、宅内電力線34を経由して、最大電力制限手段32および課金手段33に伝送される。最大電力制

限手段32にはスイッチ状態がオンすなわち、計画的電力使用の場合は、最大電力を通常より低い値に制限する。その他の構成は第1の実施形態と同様であるので、説明を省略する。

【0019】

【発明の効果】以上説明したように、本発明によれば、各需要家毎に電力使用者が計画的電力利用に協力する可否かを意思表示する意思表示手段と、報奨金及び電力使用料を課金する課金手段と、最大電力制限手段からなる構成により、電力需要家毎に計画的電力使用の可否を容易に意思表示することができ、かつ電子手段による報奨金を配布することができるので、協力の効果を直接、需要家に訴える事ができる。その結果、地域社会全体として、電力の節約、有効活用が可能になる。

【図面の簡単な説明】

【図1】本発明の第1の実施形態に係わる電力供給制御及び課金システムの全体の構成例。

【図2】本発明の第2の実施形態に係わる電力供給制御及び課金システムの全体の構成例。

【図3】本発明の第3の実施形態に係わる電力供給制御及び課金システムの全体の構成例。

【図4】図1の課金手段3の内部構成例。

【図5】（a）図1の意思表示手段1の内部構成例。

（b）図1の意思表示手段1の内部動作フローを表わしたアクティビティ図。

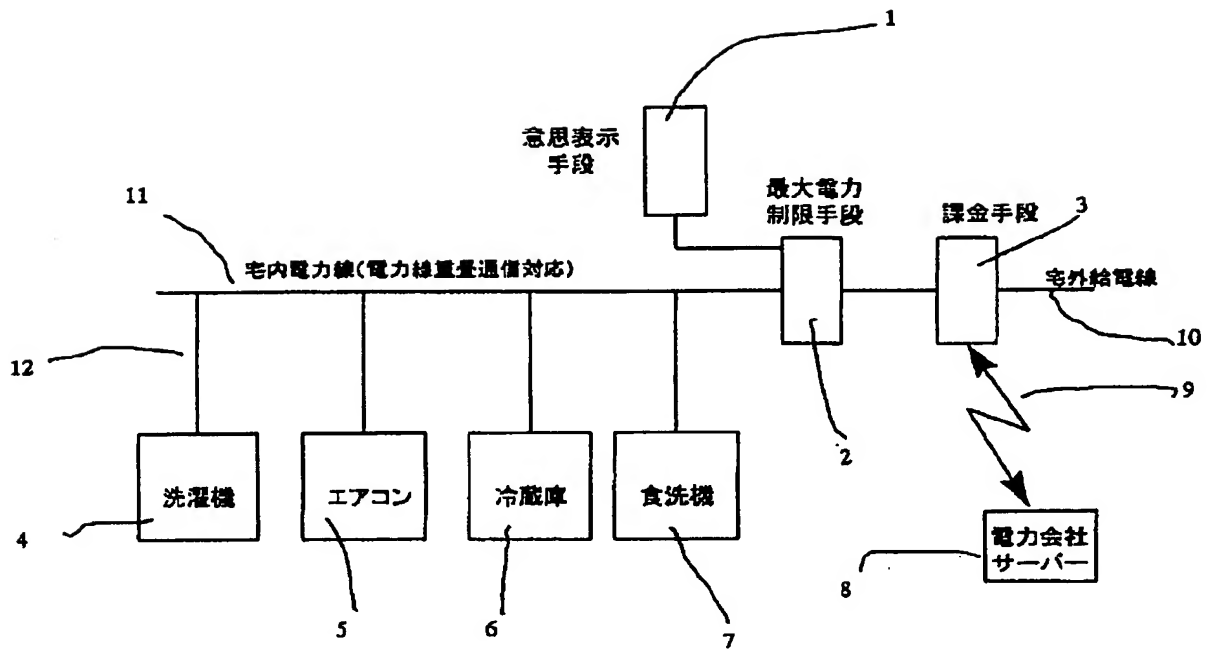
【図6】図1の電力供給制御及び課金システムの動作を図示したシーケンス図。

【図7】図1の最大電力制限手段2の内部構成例。

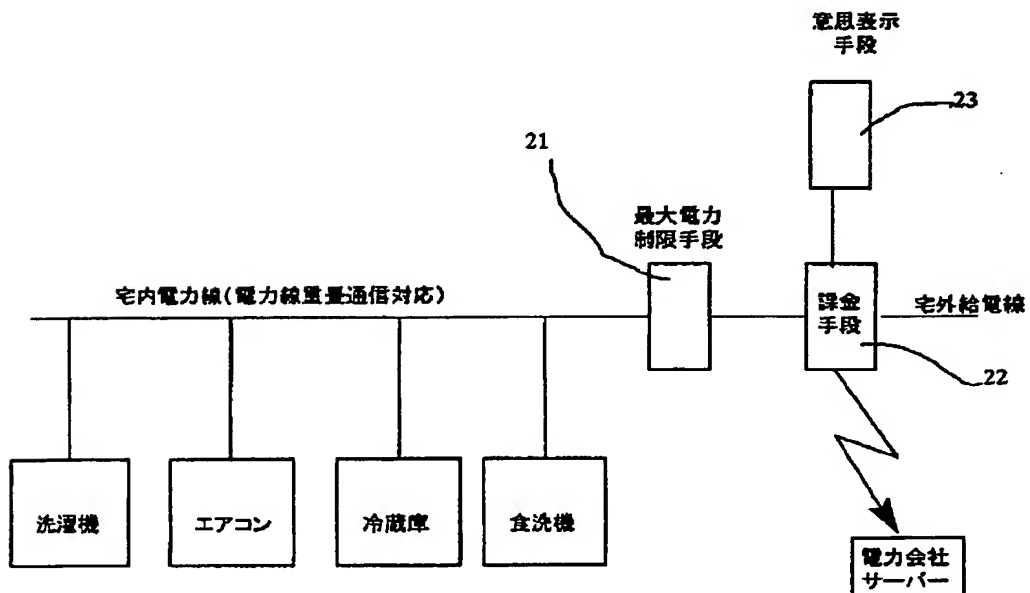
【符号の説明】

- 1 意思表示手段
- 2 最大電力制限手段
- 3 課金手段
- 8 電力会社サーバ
- 10 宅外電力線
- 11 宅内電力線

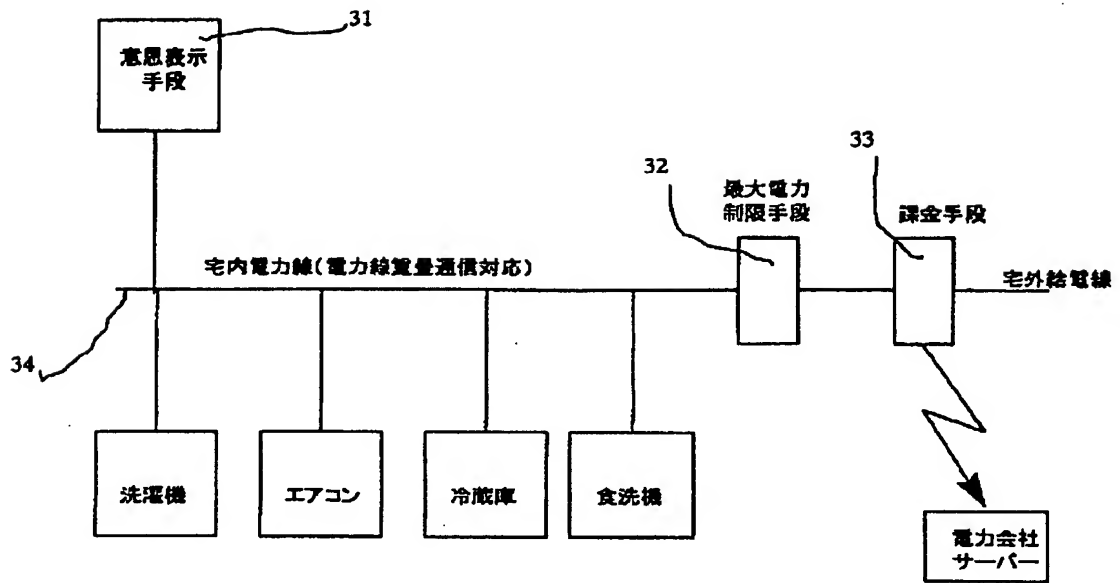
【図1】



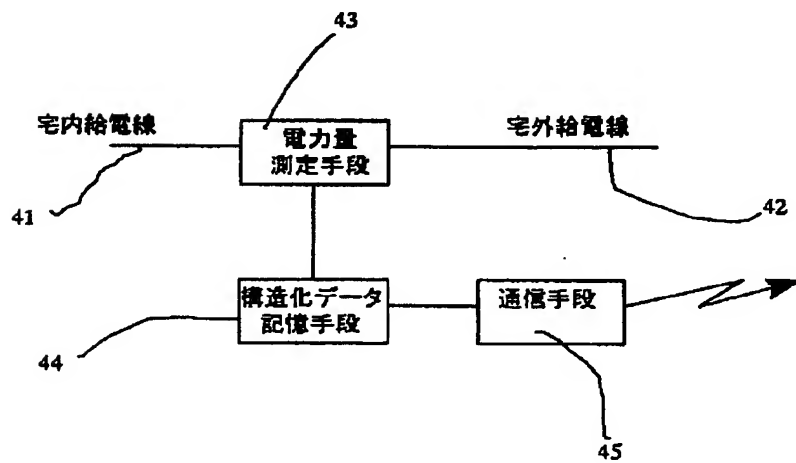
【図2】



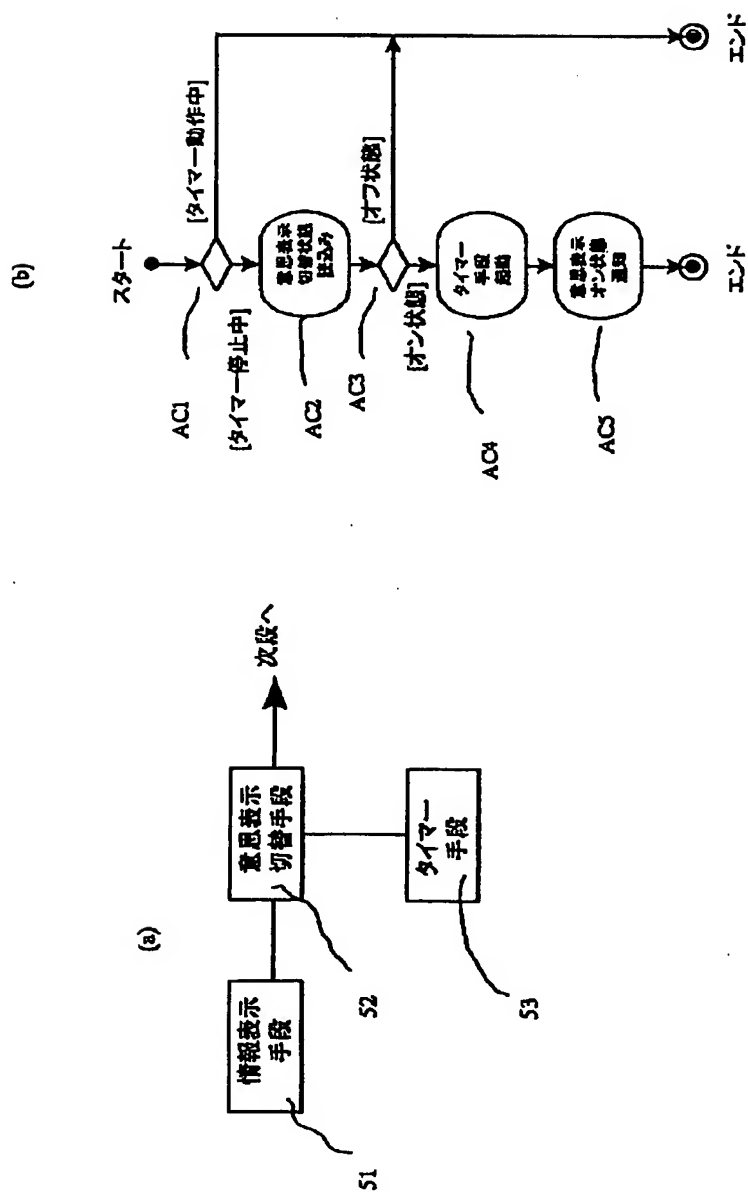
【図3】



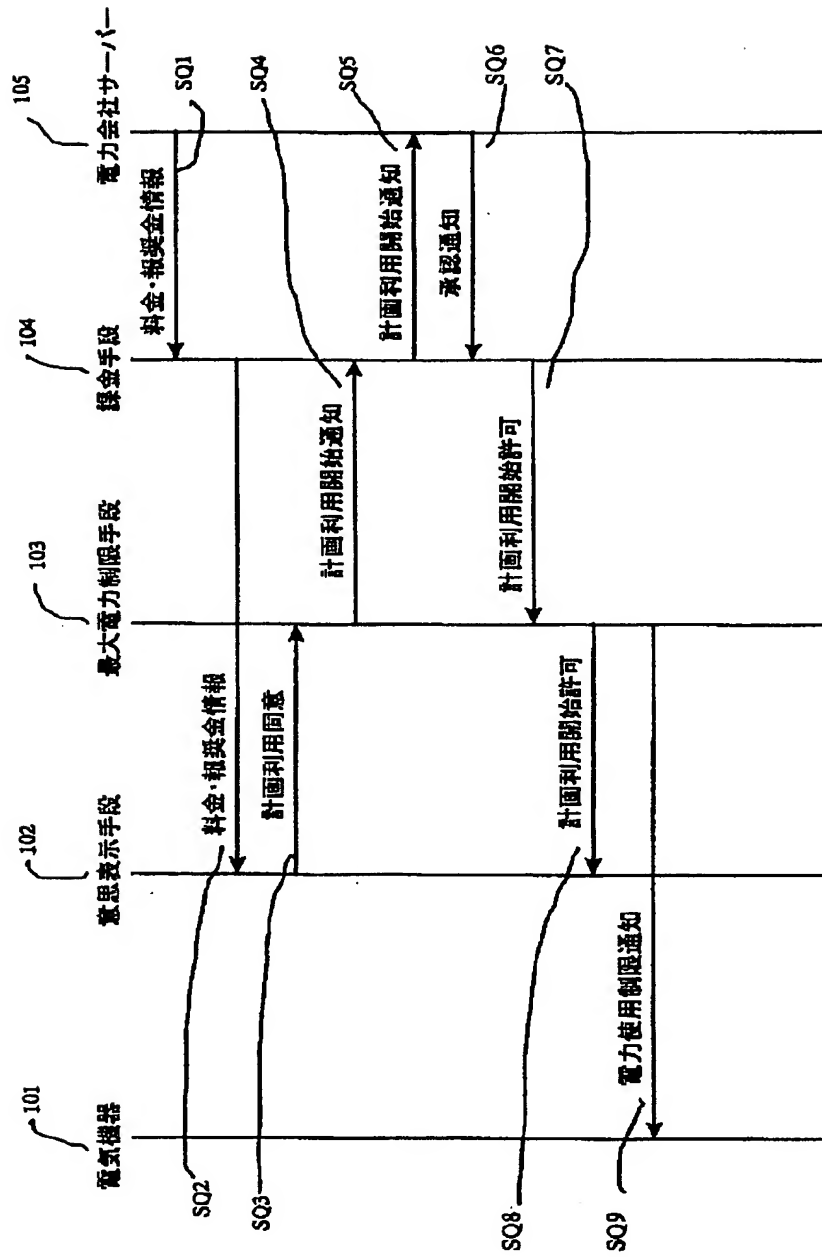
【図4】



【図5】



【図6】



【図7】

